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ABSTRACT

As part of a district-wide longitudinal study of the implementation of a science curriculum innovation, researchers developed case studies of a sample of nine elementary schools in the Jefferson County School District, a large suburban system in Colorado. The study applied the Concerns-Based Adoption Model, which assumes that change is carried out by individuals in two general stages, the first involving stages of concern about the innovation, the second comprising levels of use of the innovation. Both quantitative and qualitative data were gathered, including survey assessments of teachers' concerns and use levels and ethnographic descriptions of the activities of district and school staff. Among the variables examined were teachers' attitudes and concerns, their previous experience with innovations, presence in the school of an innovation specialist, team teaching, school building architecture, students' socioeconomic status, and school principals' attitudes about the innovation. Analysis showed the nine schools fell into three groups, one concerned about managing the innovation, one concerned about the innovation's impact, and the last having a mixture of the two concerns. Principals' levels of support for the innovation and activities as change facilitators were the main factors determining the school's type of concern. (RW)

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IMPLEMENTATION AT THE SCHOOL BUILDING LEVEL: THE DEVELOPMENT AND ANALYSIS OF NINE MINI-CASE STUDIES

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IMPLEMENTATION AT THE SCHOOL BUILDING LEVEL: THE DEVELOPMENT AND ANALYSIS OF NINE MINI-CASE STUDIES[1, 2]

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For the last ten years there have been pessimistic declarations that change is not occurring at the classroom level. Such laments from observers of school improvement are frequently supported with expert testimony and in-depth case studies of failures. In contrast, this paper, a synthesis of nine "mini-case studies," reports on varying degrees of successful school change. A set of hypotheses about the factors that appear to be related to change at the classroom level are proposed. The hypotheses suggested are grounded in both qualitative and quantitative data.

Studies of change in schools usually take one of two perspectives: explore one campus and study it in-depth, or examine a large sample across many

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[1]This paper is based on a set of inhouse papers developed by staff of the Research on Concerns-Based Adoption Project, Research and Development Center for Teacher Education, The University of Texas at Austin: Gail Brown, Teresa Griffin, Gene Hall, Shirley Hord, Susan Loucks, Nettie Miller, Beulah Newlove, Bill Rutherford, and Pat Zigarmi. Special recognition is given Linda Simons, who gathered the ethnographic data for the study, and whose thoroughness and persistence are greatly appreciated. Special thanks are also given to our colleagues in Jefferson County, Marge Melle, James Metzdorf, and Harold Pratt, who participated in the development of many of the ideas presented in this paper.

[2]The research described herein was conducted under contract with the National Institute of Education. The opinions expressed are those of the authors and do not reflect the position or policy of the National Institute of Education, and no endorsement by the National Institute of Education should be inferred.

districts with limited depth at each site. By contrast, the observations and hypotheses reported in this paper derive from a multiple-school sample studied over an extended period of time as part of an intensive three-year study of change. In addition, while a wide-ranging set of variables was explored in each building, the nine schools are a subset of elementary schools in one large suburban district, thereby providing control over district context variables. Since this district has a long standing policy of district-wide curriculum, the implementation "game plan" was the same for all of the district's 80 elementary schools.

As a part of a district-wide longitudinal study of an elementary science curriculum implementation, nine schools were selected to be the foci of nine mini- case studies. The objective of the case studies was to examine across-building differences and within-school influences on implementation of the innovation by individual teachers. The objective of this paper is to report on the school-specific data and to synthesize across the nine case studies. Using an open-ended style, hypotheses are developed about the factors that influenced individual teacher change in relation to the new curriculum. The case studies and hypotheses are being used in the planning of a set of two-year studies of the influence of building principals on teacher change.

CASE STUDY METHODOLOGY

Beginning in 1976, researchers at the R&D Center for Teacher Education at The University of Texas at Austin and the staff developers and science curriculum coordinators in Jefferson County School District, Colorado, collaborated in an effort to apply the Concerns-Based Adoption Model (CBAM) (Hall, Wallace & Dossett, 1973) to the implementation of a district-wide revision of the science

program for grades 3-6. During this period of collaboration, qualitative and quantitative methodologies were used to document various aspects of the change process.

Both types of methodologies were used in the belief that qualitative data integrated with quantitative data could produce more powerful insights about the change process than either could have produced alone (Sieber, 1973). Data collected over the three-year period have been analyzed and reported in several ways. The overall game plan for the change effort has been described by Loucks and Pratt (1979) and Pratt, Melle, Metzdorf & Loucks (1980). Several papers have been developed which focus on the district-wide effects of implementation (Loucks & Hall, 1979; Loucks & Melle, 1980; Pratt, Winters & George, 1980). Other papers have linked the quantitative data to the intervention game plan (Hall & Loucks, 1978).

The Concepts and Their Measurement

The Concerns-Based Adoption Model (CBAM) was developed as a means to understand and describe innovation adoption and implementation. The CBAM assumes that change is a process accomplished by individuals. The CBAM makes it possible to pay particular attention to two aspects of the individual's developmental growth in relation to the innovation. These two dimensions are Stages of Concern About the Innovation (Hall & Rutherford, 1976) and Levels of Use of the Innovation (Hall, Loucks, Rutherford & Newlove, 1975).

Seven Stages of Concern (SoC) have been defined to describe the feelings individuals experience in regard to the innovation. These range from concerns about how the innovation will affect them personally, to concerns about how to complete the tasks related to using the innovation and finally to concerns about

the impact of the innovation on clients or pupils. The seven Stages of Concern are defined in Appendix A.

For research purposes, Stages of Concern are measured using the thirty-five item SoC Questionnaire. The raw data from the SoC Questionnaire are converted to relative intensity scores by use of scale specific percentile tables. Concerns profiles are then constructed which graphically display the intensity of all Stages of Concern for the respondent(s). Procedures for clinical interpretation of these profiles have been established (Hall, George & Rutherford, 1977).

Eight Levels of Use (LoU) have been identified that describe the behaviors of individuals during implementation. An individual begins with Nonuse of the innovation, then moves to Orientation about the innovation, and Preparation for first use. Initial use is usually Mechanical, but as experience with the innovation increases, users can move into a Routine pattern of use. Individuals then may Refine their use of the innovation, Integrate their refinements with those of their colleagues, or Renew their use, based on assessments of the impact of the innovation on clients or students. The definitions of each Level of Use are presented in Appendix B.

LoU is assessed using a focused interview procedure (Loucks, Newlove & Hall, 1975). A trained interviewer conducts a ten to thirty minute interview with each nonuser or user. The LoU interviewer uses a branching technique based on the operational definition of LoU and follow-up probes to obtain information about what the teacher is doing. An overall Level of Use rating can then be assigned to each person interviewed.

A third concept, Innovation Configurations (IC) (Hall & Loucks, 1978), has been developed to describe and measure the various operational forms of the innovation that result as individuals adapt it for use in their particular situa-

tion. Using this concept, the components of an innovation are identified, and an individual user's Innovation Configuration can be described. An Innovation Configuration is determined by identifying the components a user selects, the variations within the components and the organization of the components.

The Data Base

Several sources of data were used by CBAM staff in developing the nine case studies. The quantitative data included regular assessments of teachers' Stages of Concern About the Innovation (SoC) and their Level of Use of the Innovation (LoU). Innovation Configurations (IC) were also assessed although not as rigorously, since this concept was under development at the time. SoC and LoU data were collected on five occasions as the change process unfolded (fall 1976; spring 1977; fall 1977; spring 1978; spring 1979). Innovation Configurations were assessed at these same schools on two occasions (spring 1977 and spring 1979).

The qualitative data documented what was done by district staff developers and science department staff to facilitate implementation of the innovation, the Revised Science Program. Forty-one volumes of ethnographic reports were compiled by a full-time ethnographer who was located on-site during the first two years of the implementation effort. These protocols include descriptions of the activities of district administrators, staff development and science department staff, and teacher leaders and science teachers participating in the implementation. In addition, several of the Jefferson County district staff kept records of their activities as "participant observers." CBAM staff kept notes of their observations about the implementation when they were on-site for collaborative planning purposes and/or collection of quantitative data. District memoranda and documents related to the science implementation effort were also a part of the qualitative data base.

Development of the "Mini" Case Studies[3]

The mini case studies were developed as part of the advance work for a new study of the change process. In writing their case studies, staff were asked to focus on several conceptual and methodological issues. The conceptual focus was on identifying building level influences that were related to change or lack of change in teachers' SoC, LoU, and IC. In particular, through the case studies, hypotheses were to be developed about the relationship between principal behavior and users' SoC, LoU, and IC. In addition, as several different data collection methodologies were used in this study, development of the case studies provided an opportunity to assess the specific usefulness of each. The immediate use of the case study effort would be to influence decisions about data collection procedures and variables to be observed in the upcoming study of principals.

REVIEW OF THE IMPLEMENTATION GAME PLAN

To allow the Science Department staff to focus their efforts on one-third of the total number of schools at a time, the overall plan for implementing the innovation called for introducing it (the Revised Science Program) across the district by phases at roughly six-month intervals. The 80 elementary schools in the district were assigned by administrative area to one of three phases (Phase I, II, or III). Inservice activities for each phase began with an orientation

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[3]The term "mini" was deliberately chosen for this work. The case studies are based on imperfect data bases and in many ways represent secondary analyses of the major district-wide study. These case studies were also intended from the outset to be short in length. The objective was to use the data and case study development activity as a heuristic mechanism rather than simply creating more in-depth tomes about change in one school.

for administrators, where school principals learned about the equipment and supplies needed for the Revised Science Program, about ordering and scheduling procedures, and other details about the management of the innovation. They also heard suggestions for how to be supportive of their teachers during the change effort.

Teacher exposure to the innovation started with a brief after school "pre-inservice" session aimed at creating awareness of the new science program. Two months later the inservice began; three separate full-day released-time sessions were developed for each grade level, spaced over time in order to address management concerns about each science unit as that unit was being taught. Teachers were brought together by grade level to participate in the same activites that they would be using with students, to learn some management techniques, and to become familiar with the day-to-day use of the program. The inservice leader-to-teacher ratio was kept small by using classroom teachers, who had already taught the curriculum, as trainers.

Between inservice workshops two members of the Science Department staff visited schools for "comfort and caring" activities, such as talking with teachers about issues or observing science classes to help teachers deal with problems. When called upon, the Science Department staff also provided other types of assistance, from cleaning and organizing school science storage areas to rearranging teaching schedules and unit plans so science teaching could run more smoothly (Pratt, Melle, Metzdorf, & Loucks, 1980).

The same basic game plan for implementing the innovation was used for all three phases. The same district personnel and resources were available. The Texas R&D Center's CBAM staff continued to work as collaborative partners in the design of the concerns-based game plan and continued to collect quantitative and qualitative data in a representative sample of schools.

BUILDING LEVEL INFLUENCES ON CHANGE

This change effort provided a unique opportunity for exploring building level influences on change. Selected for case studies were nine schools, which were judged to be representative of the three phases and for which the most extensive data were available. The size of the schools selected ranged from one with 428 students and 17 teachers to one with 930 students and 39 teachers. Two of the nine schools had female principals. During the summer of 1979 each case study author developed a 15 to 25 page report of the data and their interpretations. These drafts were shared with field site colleagues for critiquing and checking for factual accuracy. In October, a two-day debriefing meeting was held involving CBAM and Jeffco staffs. At this meeting one point of consensus was that several of the case studies contained data and interpretations too sensitive to be placed in general circulation. In addition there was general consensus about key factors that had been nominated, interpretations which were made, and hypotheses that had been generated.

The authors of this paper are responsible for describing and synthesizing these findings. The differences between the schools are presented as well as hypotheses that appear to hold across schools. To develop the across-site generalizations, excerpts from the nine case studies are presented and SoC and LoU data are cited. Within the text, SoC and LoU data are aggregated to describe types of schools and to illustrate hypotheses.

Across School Comparisons

One of the first tasks was the examination of the Stages of Concern and Levels of Use data for each school and the identification of similarities and differences. The authors were looking for indications of institutionalization[4], unusual movement or non-movement in concerns profiles, or any other

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[4]From a CBAM perspective institutionalization is defined as having all users: a) at LoU IVA Routine use, or higher, b) with Stage 1, 2, and 3 concerns low and c) using acceptable innovation configurations.

patterns that might be illuminating. The school by school data were clearly different in some ways and surprisingly similar in other ways.

As an example, the Levels of Use distributions were quite similar. Teachers in all schools moved from nonuse (LoU 0, I and II) to use (LoU III-VI). Over time the proportion of teachers at LoU III Mechanical Use decreased and the proportion of LoU IVA Routine users increased. In general, few teachers were observed to be at the higher LoU's.

The SoC data provided more distinction between schools. In the Fall of '76 teachers in all schools generally had typical nonuser concerns profiles. Their most intense concerns were on Stage 0 Awareness, 1 Informational and 2 Personal. Their impact concerns (Stages 4, 5, and 6) were relatively low. As use began, the SoC profiles looked like those typical of users, but with interesting differences. Some schools maintained high Stage 3 Management concerns, other schools shifted with time to indications of Stage 4 Consequence concerns, while the group profile for other schools remained relatively flat.

The one common feature of the SoC profiles was the constantly high Stage 0 Awareness score. This stage is interpreted differently for users than it is for nonusers. For nonusers a high Stage 0 score is an indication of awareness of the innovation. In contrast, high Stage 0 score for users indicates that the innovation is not of high priority for the respondents, in comparison to other things in their lives. It appears then that for most of the teachers in these schools, implementation of the Revised Science Curriculum was not an overwhelming event.

In an attempt to better understand why teachers in some schools continued to have high Management concerns while teachers in other schools shifted to high Stage 4 Consequence concerns, the schools were grouped by concerns profile. The nine schools were placed in one of three groups based on their overall SoC profile for the last data collection period. (For eight of the nine schools the

last data collection was in the Spring of 1979, for one this was the Spring of 1978.)

One group contained schools (#1, 2, and 3) that continued to have high Management concerns. A second group was Mixed (Schools 4, 5, 6 and 7), the SoC profiles having no sharp high or low concerns stages. There were some indications of Impact concerns, but Management concerns were also indicated. The third group of schools (#8 and 9) had concerns profiles with high Impact concerns (Stages 4, 5, or 6); Management concerns (Stage 3) were low. The rank ordering of highest stages of concern for each school is summarized in Table 1. The SoC profiles and LoU data by school for the last data collection period are presented in Figures 1, 2, and 3. The data displays indicate that Stages of Concern are useful in discriminating between schools.

Table 1

Rank Order of Intensity of Stages of Concern for School SoC Profiles

Group 1 Management	HIGH	SECOND	THIRD	FOURTH	INSERVICE PHASE
School 1:	0	3	6	2	I
School 2:	0	3	6	2	III
School 3:	0	6	3	2,4	I
Group 2 Mixed					
School 4:	0	3	2,4	1	I
School 5:	0	3	4	2	III
School 6:	0	6	3,4	2	I
School 7:	0	1	4	2	III
Group 3 Impact					
School 8:	4	0	6	5	III
School 9:	0	6	4	5	II

Once the school groupings were identified, the case studies were searched for indications of commonalities within groupings and differences between

Figure 1

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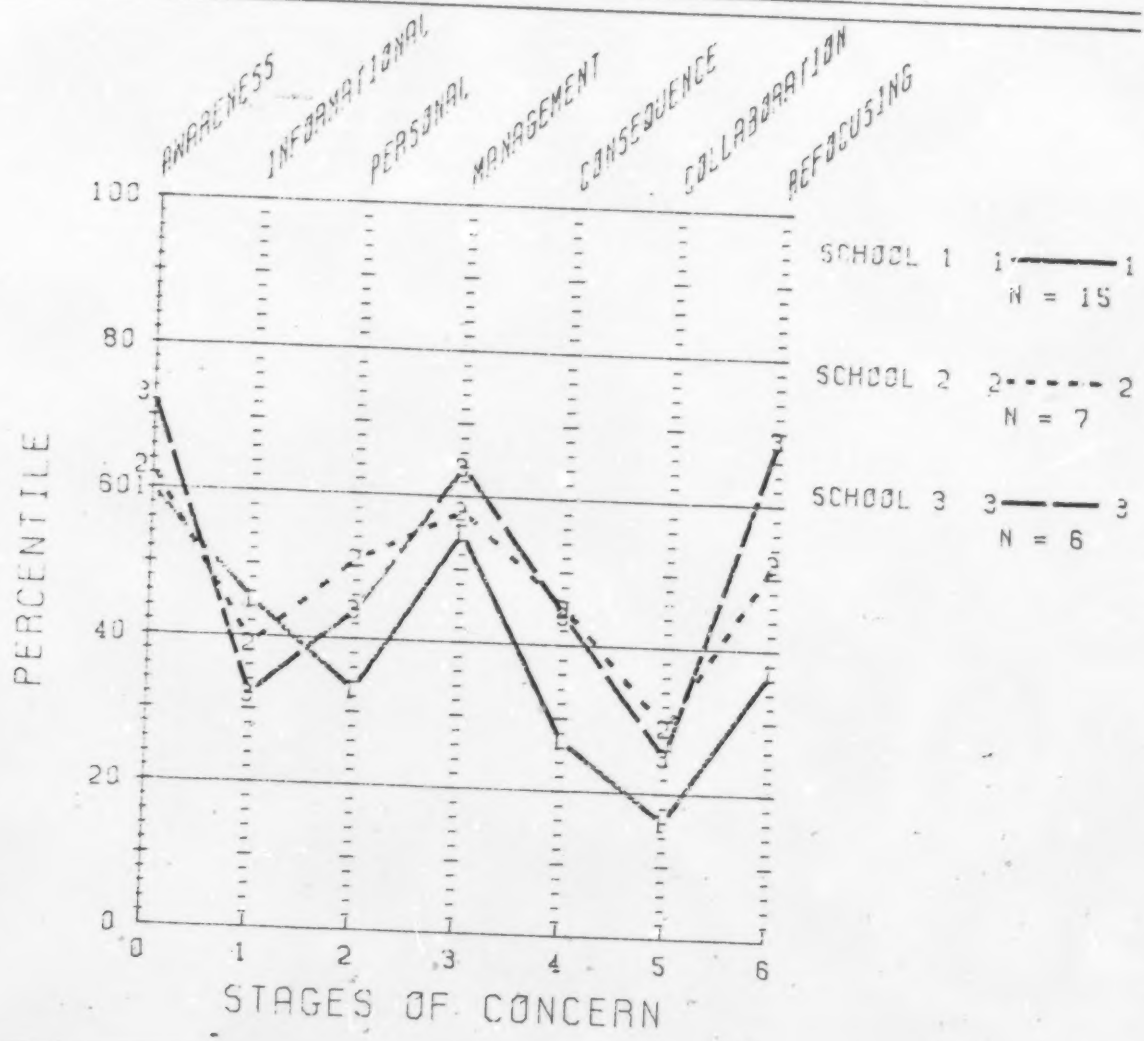
MANAGEMENT SCHOOLS
FINAL DATA COLLECTION



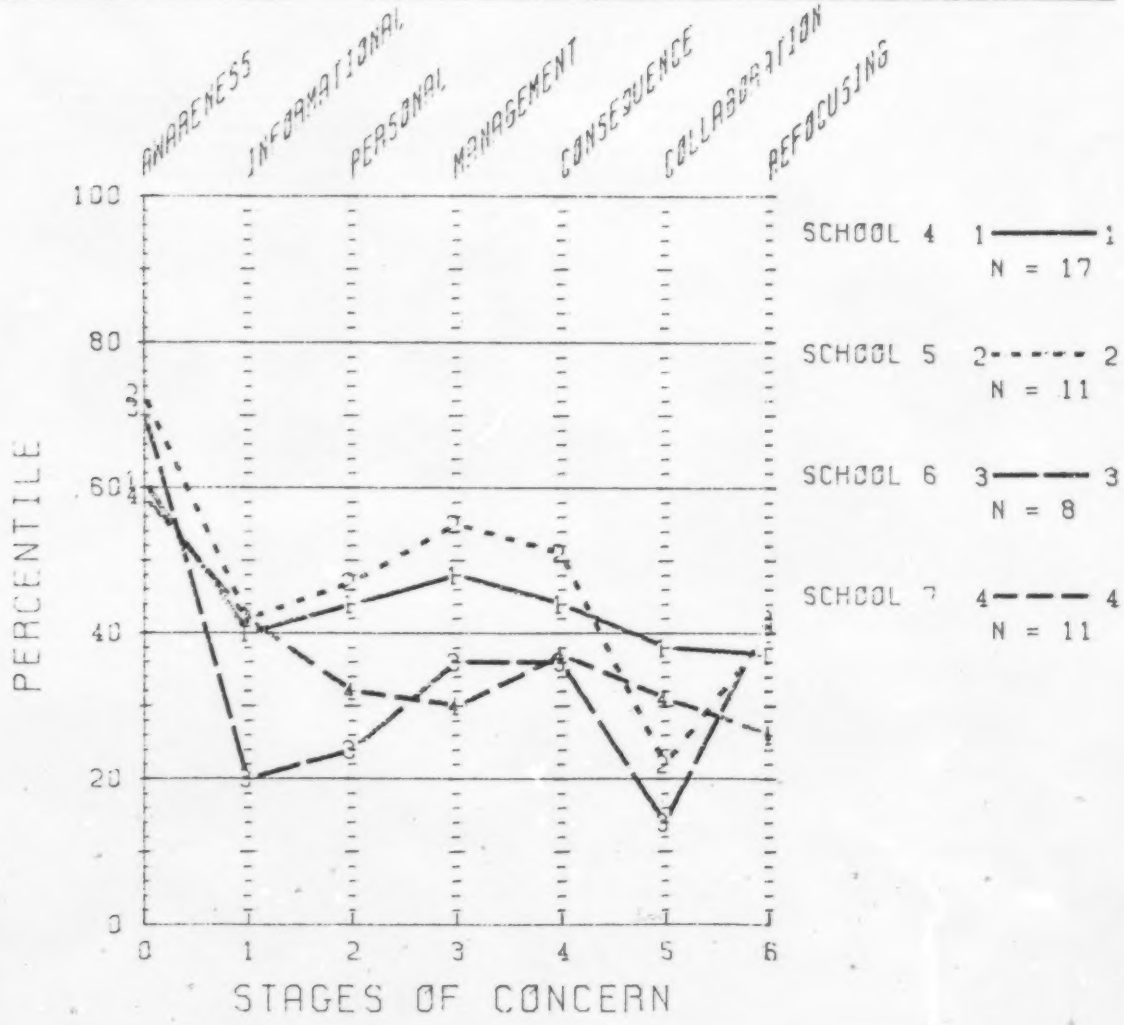
LEVELS OF USE DISTRIBUTION

	0	I	II	III	IVA	IVB	V	VI	
SCHOOL 1	0	6	6	46	33	6	0	0	N = 15
SCHOOL 2	0	0	0	57	14	28	0	0	N = 7
SCHOOL 3	12	0	0	25	62	0	0	0	N = 8

PERCENT AT EACH LOU

Figure 2

MIXED SCHOOLS
FINAL DATA COLLECTION



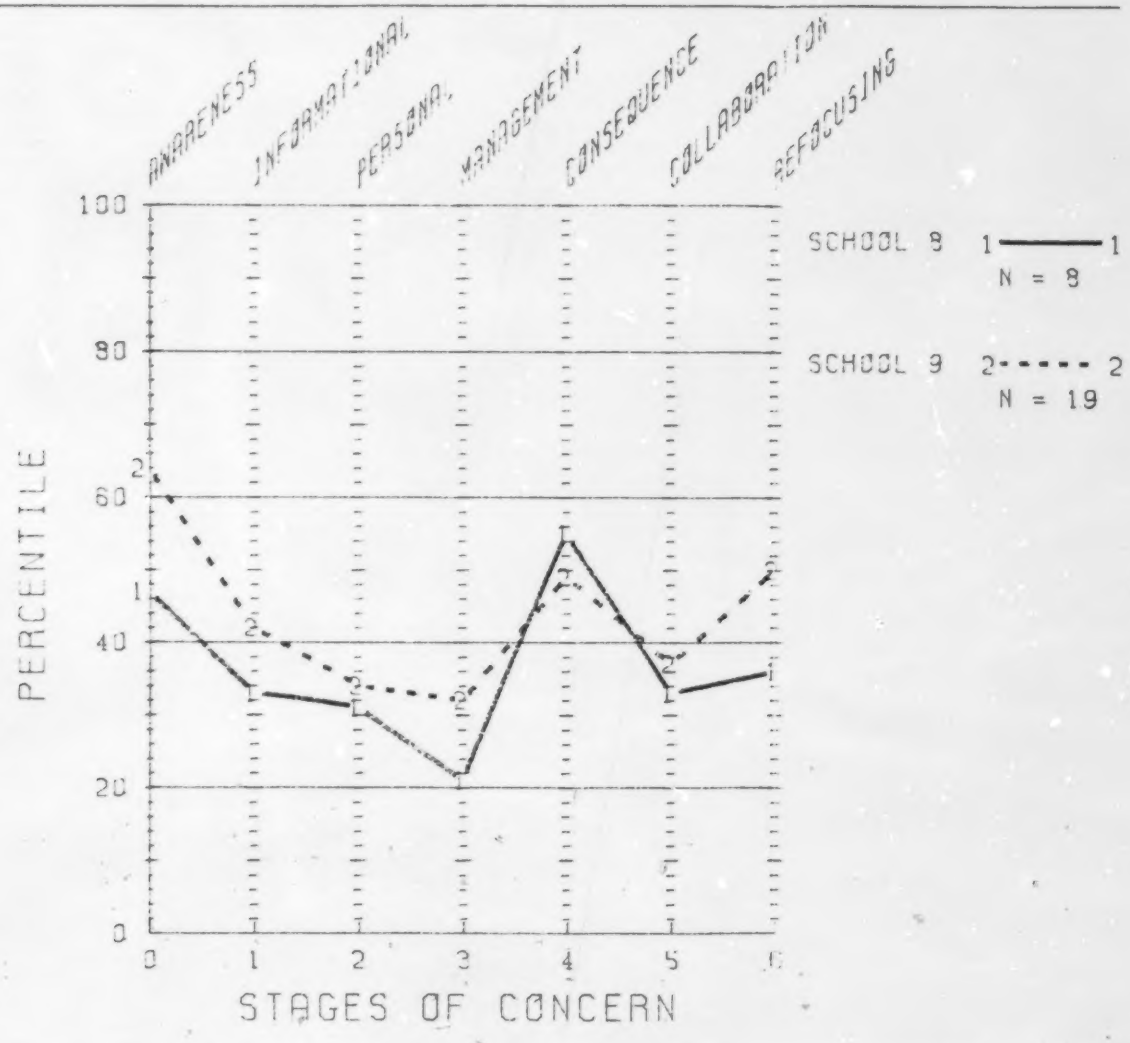
LEVELS OF USE DISTRIBUTION

	0	I	II	III	IVA	IVB	V	VI	
SCHOOL 4	5	0	5	38	27	22	0	0	N = 18
SCHOOL 5	9	9	0	18	45	18	0	0	N = 11
SCHOOL 6	0	0	0	12	75	12	0	0	N = 8
SCHOOL 7	54	0	0	0	45	0	0	0	N = 11

PERCENT AT EACH LOU

IMPACT SCHOOLS
FINAL DATA COLLECTION

Figure 3



LEVELS OF USE DISTRIBUTION

	0	I	II	III	IVA	IVB	V	VI	
SCHOOL 8	12	0	0	0	50	25	12	0	N = 8
SCHOOL 9	0	0	5	33	44	16	0	0	N = 18

PERCENT AT EACH LOU

groups. These commonalities and differences are described in the next sections of this paper. School and teacher variables are analyzed, the data available on principals are examined and hypotheses are proposed to explain what did and did not occur as the change process unfolded in each school.

Possible reasons for the clearly different concerns profiles for the schools in the different groups were many. The authors of the nine individual case studies developed interpretations and hypotheses to explain the SoC profiles and LoU distribution for each school. Interestingly, when the independently developed explanations for each school were compared for the schools within each grouping, many of the same conditions and factors were identified as probable causes.

Management Concerned Schools

These schools all have concerns profiles that are high on Stages 0, 3 and 6 (See Figure 1). The profiles are low on Stages 1, 2 and 5. Such profiles that are high on Stage 3 would indicate first of all high Management concerns. The high Stage 6 Refocusing scores indicate that the teachers have some strongly held ideas that the innovation should be used differently than it is, or perhaps not at all. The low Stage 1 Informational concerns suggest that these teachers are not interested in having more descriptive information about the innovation. The high Stage 0 score indicates that the innovation is not viewed as having a very large effect on them.

The Management Concerned Schools have large proportions of teachers at LoU III Mechanical use. Yet, two of the schools (Numbers 1 and 3) were in the first implementation phase, which means they had been using the innovation for a longer period of time. This suggests that time alone may not be sufficient for the resolution of Management concerns or movement out of Mechanical use.

A brief description of each school provides evidence of the factors influencing the implementation.

School 1: This Phase I school is in an older part of the district, students come from lower SES backgrounds, and the school buildings are older with self-contained classrooms and temporary buildings. At School 1 teachers do not team teach and do little cooperative planning. The school has a tradition of emphasis on the "basics" over science.

School 2: This Phase III school is in an older, settled area of the district. The students come from lower SES backgrounds, and declining enrollment indicates movement away from the community.

Though all the teachers have self-contained classrooms, there are several multi-grade classrooms in School 2. While there is no official "teaming," several teachers "departmentalize" and divide the instruction of subject matter. Classrooms are student-oriented, with an easy going, active cooperative atmosphere.

School 3: This Phase I school is located in a fast growing upper middle class neighborhood with many expensive new homes. The student population is growing at such a rate that it is threatening to overcrowd the building. The building, relatively new and modern, has open space classrooms where team teaching in many forms is the norm.

Science is taught in rotation with social studies and the teachers are on multi-grade level teams. This means that for at least two years (for a two-grade level team) the teachers could be teaching new units. Management of materials for science was an ever present problem within the school. Management techniques were suggested at the science inservices and the science consultants offered management assistance during school visits. The teachers at School 3 found the inservice sessions helpful, but some did not appreciate school visits, perhaps seeing these as part of a "checking up" process.

Tentative hypotheses that can be generated about Management Concerned Schools include:

a. Resolution of Management concerns does not simply occur with extended experience with the innovation.

b. Management concerned teachers see workshops that focus on management techniques as useful.

c. Teachers with high Management concerns combined with high Personal concerns may not be open to visits by innovation consultants, even though the intention is to provide "how-to-do-it" (Management) assistance.

d. Resolution of Management concerns may be hindered by Stage 6 Refocusing concerns, which indicate opinions about approaches different from the innovation.

e. Age and style of the building and the SES of the students are not related to resolution of Management concerns.

f. Whether teachers are self-contained or in teams does not appear to be related to maintenance or resolution of high Management concerns.

Mixed Concerned Schools

The Mixed Concerned Schools are represented by relatively flat SoC profiles (See Figure 2). There are no extreme peaks or valleys across the stages although there are consistently high Stage 0 Awareness scores. Management (Stage 3) concerns are evident in most of these schools. Unlike the Management schools, the Mixed schools also show some indications of Stage 4 (Consequence) concerns. In general, the users tend to be at LoU IVA Routine with very few individuals at higher LoU's. There are some across-school differences to note, but in general these schools represent sites where the innovation has been implemented with a minimum of fuss. At some of these sites innovation configurations data indicate that the teachers are using minimal forms of the innovation; thus implementation would be relatively simple with little reason to have sustained high Personal or Management concerns.

School 4: This Phase I school is relatively new and modern. It is located in a rapidly developing upper middle class community. The "basics" are emphasized and team teaching and individualized instruction are used throughout the school.

Because of teaming and varying vacation schedules, teachers were confronted constantly with new teaching schedules, new groups of students and new teaming arrangements. For the first year of implementation, a science specialist in the school taught many of the science classes and served as a resource to other science teachers. During the second year the science specialist was phased out and all teachers taught science. Many of the teachers had experience teaching the previous science curriculum, and although they relied on the specialist when he was available, they were able to manage without him. Teachers did not seem to feel frustrated or even particularly concerned about these changes.

Teachers at School 4 responded positively to the inservice sessions and to assistance from the innovation consultants. Most teachers made an effort to follow the innovation users' guide closely. This led to fairly consistent use, but at the same time resulted in teachers feeling that they were not being creative.

School 5: This Phase III school, located in a middle class suburb, has a fairly stable enrollment. The building has both self-contained classrooms and open classrooms.

The teachers at School 5 were willing to adopt the new program, and some were even eager to cooperate. This school had a science curriculum incorporated into an established program. Many teachers were, therefore, "old pros" at teaching science. The new curriculum was viewed as beneficial, with minimal changes from the program they were accustomed to. Teachers at School 5 had a great deal of freedom and influence in decision-making within their own domains. It was assumed they would carry out district mandates but were free to do so in their own fashion.

School 6: This Phase I school is relatively modern, with a modified open concept floor plan. It is located in a middle income suburban neighborhood. The school staff are organized around grade level teams. It appears that on a weekly or perhaps monthly basis teachers pick and choose what they will do in relation to science as well as other areas. There is clear movement from non-use to use in the SoC and LoU data of School 6; however the high Stage 6 scores indicate teachers who may be dissatisifed with the innovation. This profile does not change over time and there is little indication of any interventions to address these concerns. It was also observed by the case study author that the LoU of teachers varied according to how familiar they were with different units.

School 7: School 7, a Phase III school, is in a middle-class suburban neighborhood. Its architecture is modern with open areas. The majority of teachers have at least eight years teaching experience and many have experience teaching science. Teachers often team teach, plan units together, and exchange students for science and social studies.

School 7 employs a full time science specialist teacher who teaches several science classes and assists other teachers in science-related activities. This is the likely reason for the continuing number of nonusers and for the "mixed" concerns of the teachers.

The school-based science specialist probably addressed any early Management concerns from the teachers. However, Impact concerns were not intense at the final data collection period. The SoC profile shows Informational concerns dominant, with Management and Impact concerns relatively equal and not particularly intense.

The science specialist also served as a science inservice leader. The principal of School 7 was a member of the Science Department's Principals Advisory Committee.

Tentative hypotheses about the Mixed Concern Schools include the following:

g. Movement to higher LoU's does not automatically follow the establishment of LoU IVA Routine use.

h. Past experience with practices similar to those required by the innovation results in lower Personal concerns and quicker resolution of Management concerns.

i. The resolution of Management concerns does not automatically bring arousal of Impact concerns.

j. An innovation specialist as a teacher and teacher resource within a building can anticipate and moderate Management concerns.

k. When one teacher is the major user of the innovation other teachers remain at nonuse and are likely to have less intense concerns about the innovation.

Impact Concerned Schools

Two schools in the study moved from nonuse to use with resolution of Management concerns and arousal of some Impact concerns. In both schools there was a steady increase over time in the number of teachers to LoU IVA and higher and a decrease in the number of persons at LoU III. The concerns profiles for the two Impact concerned schools (see Figure 3) peak on Stage 4 Consequence concerns. These teachers are indicating primary concerns about how the innovation and their individual use is impacting students. Teachers in School 9 have some ideas (high Stage 6) about alternative uses as well. The Stage 0 score suggests that neither faculty is overly consumed in their use of the Revised Science Curriculum in comparison to other aspects of their work.

One school was in Phase II and the other in Phase III. This suggests that the amount of time since initial implementation is not the major factor in

attaining Impact concerns. None of the schools in the earliest adoption phase had teachers with Impact concerns at the final data collection period.

School 8: In Phase III, School 8 is in an older part of the district and the students come from lower SES backgrounds. The building is older with self-contained classrooms. The majority of teachers had at least eight years of teaching experience. Teachers often taught in teams, planned together and exchanged students. School 8 had had a science program in the past and most of the teachers were accustomed to teaching science. The school had a teacher who participated in writing science units and was an inservice leader for the innovation. The principal served on the Science Department's Advisory Council. Also in School 8, seven of the eight grade 3-6 teachers were responsible for teaching science, so the burden of implementation was spread among the staff.

School 9: This Phase II school is located in a newly developed outlying, middle class suburb. The architectural design of satellite areas provides a quasi open-structured facility. The pupils have higher SES parents who represent professional and business backgrounds. Two-thirds of the students attend school at any given point in time, as this is a year-round school, with all constituents divided into thirds for attendance.

Teachers are described as "old pros" in science and other instructional areas, with no particular problems. These teachers, already experienced in teaching science and in teaming for science, were looking forward positively to learning about and using the new science program. The faculty has been described as friendly, and also as strong, with "opinionated" teachers. Active and available to the faculty early in the implementation was an inservice leader. Two years later an additional science inservice leader was transferred to this school. The principal served on the Science Department's Principals Advisory Committee.

Additional hypotheses about implementation are proposed from the study of Schools 8 and 9 (Several of these have also been suggested as influencing Management and Mixed Concerns Schools.):

m. Movement to institutionalization, Refinement LoU's and Impact concerns is not simply related to extended experience with the innovation.

n. If past practice closely approximates the innovation then individuals in the change process can move more quickly to Impact concerns.

o. An in-the-building innovation specialist, such as an inservice leader for the innovation, can help resolve Management concerns.

p. A teacher in the building who helped develop the innovation can facilitate implementation at the building level.

q. Instructional and administrative staff who have outside the building involvement in innovation related activities can facilitate building use.

r. Teaming can help facilitate implementation by providing mechanisms for coordination, communication and the exchange of information.

s. The SES of the students is unrelated to the rate of change.

t. The architectural characteristics of the building are unrelated to the rate of change.

THE PRINCIPAL AS KEYSTONE

In reporting the preceding descriptions and hypotheses, references to the principal were deliberately kept to a minimum. This was done in order to explore other variables that affect change or non-change of teachers and also to provide background to the emerging hypotheses about the effects of the building administrator.

In the case studies there are references to behaviors of and interventions by the principals. The amount of information available for each principal varied considerably depending on where the ethnographer, district staff and research staff happened to spend their time. However, general impressions can be developed in all cases. Brief summaries of the descriptions of each principal are presented in Table 2. These descriptions are not always complete, but provide some flavor of the persons and what they do. Note that the principals are grouped in the same way as the schools.

Based on our field work and the analyses of the data in the case studies it appears that the principals functioned differently in the different kinds of schools. Principals in the Management Concerned Schools did not get personally

Table 2

Excerpts of Principal Descriptions from the Mini-Case Studies of Nine Schools

Management Concerned Schools	
School 1	Concerned with maintaining status quo. Did not communicate with teachers regarding the innovation. The administrative assistant was new to the school and received no information from the principal about implementation requirements. The administrative assistant handled everything related to science.
School 2	Not often around when interviewers came but was always friendly when they met. More than once reported being with a child. Jotted down notes about suggestions from science consultants. Permitted teachers to make their own decisions about whether to teach science or not. Says "the students come first." Concerned with instruction in general, not with any particular subject area.
School 3	Shares thoughts, opinions and philosophy openly with teachers. Differentiates teachers based on their philosophies and reactions to the innovation. Talks to research staff about where teachers are in relation to the innovation and mentions no plans to intervene. Does not monitor time allotment for science. Assigned teacher to handle school science materials but did not monitor. Was in favor of teaming but did not work to link teachers since each teacher was perceived as being a leader. Views faculty as playing a crucial role in implementation. Is aware of the feelings and opinions of the teachers and to a degree knowledgeable about what is going on in classrooms. Questions the district's time allotment for science when talking to teachers and district administrators. Views teachers as dedicated leaders, effective communicators with parents and student-oriented. Sees teachers as sharing openly with the principal. Sees principal and teachers as responding to parents.

Mixed Concerned Schools

School 4

Has a wide program focus and is not overly committed to one particular subject area.
Maintains various kinds of innovation thrusts.
Reads much of the professional literature.
Feels almost powerless against pressure from central administration.
Also feels a lot of community pressure.

School 5

Appears comfortable with the principal's role.
Teachers were always informed and scheduled for data collection.
Style of interaction is "peer to peer."
Does his job competently and carries out the mandated missions of the central office.
The principal "tossed off" science consultant's suggestions for interventions that would have required direct authoritative supervision.
Attitude toward the innovation was one of acceptance, not enthusiasm nor resistance.

School 6

Not readily accessible to outsiders.
The principal frequently asked if the study was over, but continued to keep the school in it although the teachers were not enthused.
Played a minimum role of involvement in the implementation.
Did not require teachers to attend all of the inservice sessions.
Was not consistent in support of the innovation.
Seems to have mixed feelings about the innovation and its implementation.

School 7

Communicated to teachers the expectations that science be taught.
Served on the science department's Principal Advisory Committee.
More administrative than instructional in approach to teachers.
Communicated expectations and consulted with teachers when problems arose.
Treated the innovation as one of many curriculum areas and not a major emphasis.

Impact Concerned Schools

School 8

Communicated to the teachers the expectation that science be taught.
Required district curricula and time allotments be adhered to.
Gave special attention to science in first year of implementation.
Personally attended to the management of equipment and materials.
Served on Principal Advisory Committee.
Consciously intervened in many ways to ensure acceptance and use of the innovation.
Once a week ate lunch with a small group of children.
Has and can describe long-term goals for the school.
Wants teachers to communicate with one another and work together.
Wants kids to be comfortable in and feel good about school.

School 9

Said "I put their (the staff's) feet to the fire."
Insisted that teachers would teach the new science.
Said, "We are going to implement it."
Solicited teachers problems and used a problem-solving approach relative to science.
Insists that the buck still stops with the principal who does not abdicate authority.
Can describe actions taken with each teacher and how it fits into a larger game plan.
Can articulate assumptions underlying the interventions made.
Found needed materials for teachers.
Served on Principals Advisory Committee.
Believes the principal should back staff with support and abundant equipment.
Thinks far ahead and is planning to make changes.

involved with teachers and their use of the science innovation. Rather, these principals delegated responsibility or made overall decisions with little follow-up on the results. For example, in School 1, the principal assigned the administrative assistant to handle anything related to science, and in School 3, the principal assigned a teacher to handle science materials but did not periodically check to see what was happening. The principals in these schools seemed to be more concerned with general issues rather than specifics and left teachers on their own to determine how to implement the innovation.

The principals in the two Impact Concerned Schools, 8 and 9, were by comparison "science activists." They were concerned about supporting and helping teachers in their use of the innovation. On a weekly and daily basis they were monitoring what teachers were doing with science. They set policy within the school that clearly indicated that science would be taught. They worked on teacher-specific implementation problems. They also served on the district-wide principals committee for science. In addition, these principals were described as having long-term goals and visions for their schools and teachers. There is a dynamic energy about them, a sense of commitment and direction for attaining tneir goals.

The principals in tne Mixed Concerned Schools have some attributes of both Management and Impact Concerned School principals. The principal in school 7, for example, also served on the district principals committee for science and communicated to teachers expectations about the teaching of science, suggesting Impact concerns. Yet, the energy is not there; the principal is described as "comfortable and interested" and "more administrative than instructional" in approach.

Principals in schools 4 and 6 did not seem to be concerned about science as a special priority. Other activities that seemed to compete with science were

encouraged (e.g., maintaining different innovation thrusts in school 4 and not requiring attendance at science inservice in school 6). In total, the principals in the Mixed Concerned Schools seemed to have sent mixed messages to their teachers. In several cases these principals appear to be less clear about long-term goals for their schools.

Based on these data and analyses, a set of hypotheses are proposed about principals and their effects on school change efforts. It appears that the concerns model can be applied to principals in their facilitation of an innovation as it has been applied to teachers in their use of an innovation. The first two hypotheses focus on principals' concerns in relation to their change facilitating role during the implementation of the innovation. The third hypothesis focuses on the interactions between the concerns of principals and their effects on teachers.

The hypotheses are:

1. Principals have Stages of Concern about their roles as change facilitators that can be described in the same way as the Stages of Concern that teachers have about innovations.

2. The interventions that principals use (i.e., their change facilitating style) will vary with their own Stages of Concern.

3. The arousal and resolution of teachers' concerns is related to the Stages of Concern and change facilitating behaviors of their principal.

    a. Teachers of principals who are not as concerned about impact and do not take active facilitating and managing roles relative to an innovation will have more intense Stage 3 Management concerns and they will last longer.

    b. Teachers of less involved or more inconsistent principals are apt to have high Stage 3 Management concerns coupled with high Stage 6 Refocusing concerns, indicating ongoing dissatisfaction with innovation related logistical issues.

    c. Teachers of Impact concerned principals who set directions, clarify school curricu.um goals, and become actively involved with implementation will have lower and shorter Management concerns and will move to arousal of some Impact (Stages 4, 5, 6) concerns.

These hypotheses result from the case studies and from our clinical impressions. At this time it appears that a most important factor to explain the quality and quantity of change in these schools is the concerns of the principals and what the principals did and did not do.

Epilogue

In this paper nine schools were placed into one of three groups based on change criteria that used the teachers and the innovation as the frame of reference. For us, the most important hypothesis emanating from these data is that the implementation of the innovation is different in different schools primarily because of the actions and concerns of the principal. In hindsight we suspected that we could have sorted these schools, based on analysis of the principals' concerns and change facilitating behaviors, into the same three groups that we obtained by using the SoC and LoU data of the teachers.

As an after-the-fact test of this hypothesis we wrote the name of each school on a card. We then asked two of our colleagues who know these schools and their principals to make three groups out of the nine cards, based on the "change facilitating style of the principal." They were then asked to describe the reasons for their groupings. The first staff member grouped the schools the same as the SoC groupings except put School 6 with what is labeled the Management Concerns Group and having School 2 with the Mixed Concerns Group. She did not know the principal of School 5 well enough to classify.

The second staff member also formed the same basic groups. She placed School 7 with the Impact Concerns Group, which we had also done at one point, and she identified as uncertain Schools 2 and 6 but felt that each belonged either in the Mixed Group or the Management Group.

The "quick and dirty" expert judge rating and sorting of principal change facilitating style resulted in almost identical groupings of the schools that had been obtained earlier using the quantitative SoC and LoU data of the teachers. These analyses point toward the dynamic interdependence between teachers as front line users of educational innovations and the building administrator as policy and norm-setter, resource and reward allocator. The building administrator's concerns appear to set thresholds or facilitate movement of their staff as they experience the change process.

SUMMARY

In this paper we have described our analyses of qualitative and quantitative data collected in nine elementary schools as part of a longitudinal study of implementation in one large suburban school district. These data were combined into a set of nine "mini-case studies." Out of these analyses, we have developed a set of hypotheses about factors that affect change at the school building level. The district context was controlled by district-wide curriculum and use of the same implementation game plan for all schools.

Our analyses lead us to the conclusion that the schools could be sorted into three groups based on the Stages of Concern and Levels of Use data of the teachers. Hypotheses were proposed about factors that affected the arousal and resolution of teacher concerns. Characteristics of the building principals were examined and the proposal was made that principals experience Stages of Concern and that the change facilitating role that a principal takes is related to their concerns. We hypothesized that the schools could be grouped in the same clusters if the principals' concerns and change facilitating role were used as the basis for sorting. Finally, we hypothesized that there is a relationship between the principals' concerns and their change facilitating behaviors and the

arousal and resolution of teachers' concerns and movement or non-movement of teachers' Levels of Use.

We in the CBAM project, our field site colleagues and our NIE colleagues are intently interested in further developing and testing these hypotheses. As one next step, a two-year study of principals with different concerns is now being launched. Development of a measure for assessing change facilitator concerns is near completion and procedures for documenting principal interventions has been pilot tested.

Over the next several years we hope to contribute new insights to the research, practice and policy communities about the relationships between change in the classroom and what the building administrator does and doesn't do. Contrary to much that has been written, it does not appear that teachers involved in change are isolated from the effects of building level interventions by simply closing their classroom door. Further, it appears that no matter what the principal's change facilitating orientation, there are direct but differential effects on teacher's concerns and classroom practice.

If research affirms these hypotheses, then those involved in the selection and training of administrative personnel, and management and evaluation of the change process will have to take into account a new set of variables not presently being considered. To policy level variables, district-wide variables and classroom level variables there will need to be added clearer descriptions of the building level influences on implementation, specifically the concerns and change facilitating behaviors of the principal.

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Appendix A -- Stages of Concern Definitions

Appendix B -- Levels of Use Definitions

Appendix A

Definitions:

STAGES OF CONCERN ABOUT THE INNOVATION*

6 REFOCUSING: The focus is on exploration of more universal benefits from the innovation, including the possibility of major changes or replacement with a more powerful alternative. Individual has definite ideas about alternatives to the proposed or existing form of the innovation.

5 COLLABORATION: The focus is on coordination and cooperation with others regarding use of the innovation.

4 CONSEQUENCE: Attention focuses on impact of the innovation on students in his/her immediate sphere of influence. The focus is on relevance of the innovation for students, evaluation of student outcomes, including performance and competencies, and changes needed to increase student outcomes.

3 MANAGEMENT: Attention is focused on the processes and tasks of using the innovation and the best use of information and resources. Issues related to efficiency, organizing, managing, scheduling, and time demands are utmost.

2 PERSONAL: Individual is uncertain about the demands of the innovation, his/her inadequacy to meet those demands, and his/her role with the innovation. This includes analysis of his/her role in relation to the reward structure of the organization, decision-making and consideration of potential conflicts with existing structures or personal commitment. Financial or status implications of the program for self and colleagues may also be reflected.

1 INFORMATIONAL: A general awareness of the innovation and interest in learning more detail about it is indicated. The person seems to be unworried about himself/herself in relation to the innovation. She/he is interested in substantive aspects of the innovation in a selfless manner such as general characteristics, effects, and requirements for use.

0 AWARENESS: Little concern about or involvement with the innovation is indicated.

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*Original concept from Hall, G. E., Wallace, R. C., Jr., & Dossett, W. A. A developmental conceptualization of the adoption process within educational institutions. Austin: Research & Development Center for Teacher Education, The University of Texas, 1973.

Measurement described in Hall, G. E., George, A. A., & Rutherford, W. L. Measuring stages of concern about the innovation: A manual for use of the SoC Questionnaire. Austin: Research & Development Center for Teacher Education, The University of Texas, 1977.

Appendix B

LEVELS OF USE OF THE INNOVATION

LEVELS OF USE	DEFINITION OF USE
0 NONUSE	STATE IN WHICH THE USER HAS LITTLE OR NO KNOWLEDGE OF THE INNOVATION, NO INVOLVEMENT WITH THE INNOVATION, AND IS DOING NOTHING TOWARD BECOMING INVOLVED.
Decision Point A	Takes action to learn more detailed information about the innovation.
I ORIENTATION	STATE IN WHICH THE USER HAS RECENTLY ACQUIRED OR IS ACQUIRING INFORMATION ABOUT THE INNOVATION AND/OR HAS RECENTLY EXPLORED OR IS EXPLORING ITS VALUE ORIENTATION AND ITS DEMANDS UPON USER AND USER SYSTEM.
Decision Point B	Makes a decision to use the innovation by establishing a time to begin.
II PREPARATION	STATE IN WHICH THE USER IS PREPARING FOR FIRST USE OF THE INNOVATION.
Decision Point C	Changes, if any, and use are dominated by user needs.
III MECHANICAL USE	STATE IN WHICH THE USER FOCUSES MOST EFFORT ON THE SHORT-TERM, DAY-TO-DAY USE OF THE INNOVATION WITH LITTLE TIME FOR REFLECTION. CHANGES IN USE ARE MADE MORE TO MEET USER NEEDS THAN CLIENT NEEDS. THE USER IS PRIMARILY ENGAGED IN A STEPWISE ATTEMPT TO MASTER THE TASKS REQUIRED TO USE THE INNOVATION, OFTEN RESULTING IN DISJOINTED AND SUPERFICIAL USE.
Decision Point D-1	A rountine pattern of use is established.
IVA ROUTINE	USE OF THE INNOVATION IS STABILIZED. FEW, IF ANY, CHANGES ARE BEING MADE IN ONGOING USE. LITTLE PREPARATION OR THOUGHT IS BEING GIVEN TO IMPROVING INNOVATION USE OR ITS CONSEQUENCES.
Decision Point D-2	Changes use of the innovation based on formal or informal evaluation in order to increase client outcomes.
IVB REFINEMENT	STATE IN WHICH THE USER VARIES THE USE OF THE INNOVATION TO INCREASE THE IMPACT ON CLIENTS WITHIN THE IMMEDIATE SPHERE OF INFLUENCE. VARIATIONS ARE BASED ON KNOWLEDGE OF BOTH SHORT- AND LONG-TERM CONSEQUENCES FOR CLIENTS.
Decision Point E	Initiates changes in use of innovation based on inout of and in coordination with what colleagues are doing.
V INTEGRATION	STATE IN WHICH THE USER IS COMBINING OWN EFFORTS TO USE THE INNOVATION WITH RELATED ACTIVITIES OF COLLEAGUES TO ACHIEVE A COLLECTIVE IMPACT ON CLIENTS WITHIN THEIR COMMON SPHERE OF INFLUENCE.
Decision Point F	Begins exploring alternatives to or major modifications of the innovation presently in use.
VI RENEWAL	STATE IN WHICH THE USER REEVALUATES THE QUALITY OF USE OF THE INNOVATION, SEEKS MAJOR MODIFICATIONS OF OR ALTERNATIVES TO PRESENT INNOVATION TO ACHIEVE INCREASED IMPACT ON CLIENTS, EXAMINES NEW DEVELOPMENTS IN THE FIELD, AND EXPLORES NEW GOALS FOR SELF AND THE SYSTEM.

From: The LoU Chart. Austin: Research and Development Center for Teacher Education, The University of Texas, 1975.